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(54) **Method for producing garments with cashmere or other animal fibres**

(57) A method for producing a knitwear garment starting from fibres of cashmere or other animal fibres according to the invention is characterised in that: the animal fibres, in the spinning step, are mixed with an amount of cellulose fibres, said cellulose fibres being at least 8% by weight with respect to the amount of animal

fibres; with the mixed yarn thus obtained, the knitting or weaving step, and possibly the assembly of the textile product, are carried out; and finally, the textile product is subjected to a carbonisation treatment in order to eliminate the cellulose component.

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Description

[0001] The present invention concerns the field of textile manufacturing, and in particular it regards a new method for producing knitwear garments with a high percentage of cashmere or other animal fibres.

[0002] Among the animal fibres, that of cashmere (the fur of the *Hircus* Tibetan goat) is well known for the soft, warm, silky and velvety feel which is conferred to the garments made therewith.

[0003] The yarn employed in the standard production of cashmere is composed of two plies, each of which has a thickness defined by a metric count not less than 26 Nm (that is, 26000 m for a kg of yarn), and up to 40 Nm and beyond. The production of so fine a yarn, with the carded spinning system, requires the use of cashmere fibres of particular length, not less than 32-34 mm for the 26 Nm count, and increasingly greater up to 42 mm (which is about the maximum found in nature) for the counts greater than 40 Nm.

[0004] In fact, the more the count is fine, the less fibres are found in the yarn cross-section, and thus the greater their length must be in order to offer a friction surface between fibres that is sufficient to ensure the mechanical traction resistance of the yarn itself. Therefore, the short fibres (length less than 32 mm) cannot be used, in spite of the that they would have the same quality characteristics of the others in terms of fibre fineness, softness, thermal characteristics and so on. On the other hand, the fibres of the length necessary to operate as described, are relatively rare and precious, and this affects the cost of the entire production chain, right up to the price of the final product.

[0005] The object of the present invention is to provide a new method for producing knitwear garments made of cashmere or other animal fibres which permits to obtain a result, in terms of quality of the finished garment, that is entirely comparable to that obtainable according to the prior art, but with a considerable cost decrease.

[0006] This and other subsidiary objects are accomplished with the method for producing a textile product, in particular knitwear, starting from cashmere or other animal fibres according to the invention, **characterised in that:** the animal fibres, in the spinning step, are mixed with an amount of cellulose fibres, said cellulose fibres being at least 8% by weight with respect to the amount of animal fibres; with the mixed yarn thus obtained, the knitting or weaving step, and possibly the assembly of the textile product, are carried out; and finally, the textile product is subjected to a carbonisation treatment in order to eliminate the cellulose component.

[0007] In this manner, the use of those short fibres becomes possible, since the cellulose fibres (such as viscose and cotton fibres), due to their length and fineness, carry out a binding action which permits the obtainment of a workable yarn. Once the garment is made, even after elimination of the cellulose fibres, the cohesion between the remaining fibres, and consequently the strength of

the fabric, is in any case assured by the interlace of the weaving or knitting.

[0008] The garment thus obtained acquires the same aspect of a traditionally obtained garment in pure cashmere, with even an improved quality due to the fact that the eliminated cellulose fibres leave empty spaces inside the yarn, which thus tends to be more voluminous and soft than one obtained via standard production.

[0009] The carbonisation or carbonising step is preferably of dry type with hydrochloric acid vapours; such treatment permits attacking the cellulose component without damaging the keratin component of the animal fibre. Even though they may cause a slight qualitative decline, other carbonisation systems of known type (for example, in sulphuric acid bath) can be used for obtaining a still satisfactory result. A final washing will in any case ensure the elimination of every carbonised residue, thus giving the garment a pure animal fibre composition. Other finishing treatments can follow in accordance with the prior art (dyeing, ironing etc.).

[0010] The invention will now be illustrated in greater detail with the following description of an embodiment thereof, exemplifying and non-limiting.

[0011] As mentioned, the first step of the process consists in making a yarn, through the traditional techniques and equipment of wool spinning, starting from a raw material consisting of animal textile fibres, for example and typically cashmere fibres, advantageously of short type (i.e. with length less than 32 mm), added with a certain amount of cellulose textile fibres, such as viscous or cotton fibres having, as known, greater lengths than those of the abovementioned animal fibres. The amount of cellulose fibres is at least about 8% by weight with respect to the total weight of the animal fibre (8 units by weight of cellulose fibres for every 100 units of animal fibres), preferably about 15% and in any case not greater than 40%.

[0012] The mixture of fibres thus obtained, treated according to traditional operating modes, leads to the obtainment of a mixed yarn, which is then in turn used for the weaving or knitting step, aimed at obtaining the garment (directly or following an assembly step of the various parts, as in the case of garments such as shirts, jackets or the like). In such yarn, the long cotton, viscose or other similar fibres carry out an effective retaining and binding action of the short animal fibres, conferring the strength required for the knitting or weaving.

[0013] Still with reference to the yarn, which is therefore a new intermediate product of the process according to the invention, it is important to note that, given the same fineness of the cashmere yarn finally obtained, the addition of the cellulose fibres leads to a thicker intermediate yarn, which causes an improvement of the workability and lower cost of the spinning (which is directly proportional to the metric count).

[0014] For example, and for clarification purposes, in case of a 28 Nm final count, one would start from cashmere fibres that have about 0.0357 kg weight per 1000

metres of yarn ($0.0357 = 1:28$). The addition of a 15% of cellulose fibre will lead to an increase of weight of about 0.0053 kg, again per 1000 m of yarn ($0.0053 = 0.0357 \times 0.15$). At this point, one will have 0.041 kg per 1000 m of yarn ($0.0357 + 0.0053 = 0.041$), which corresponds to a count of about 24 Nm ($0.041 = 1:24$), i.e. to a larger and more workable yarn. The intermediate yarn, considering the specific application type, will therefore normally and preferably have a count that can reach up to about 22 Nm, thus a less fine one with respect to the yarn of the standard production cycle.

[0015] Once the garment is made, this will still have the mixed composition due to the presence of the cellulose fibres. The third step of the process provides for a treatment capable of eliminating such fibres, restoring the garment, and the yarn with which it is made, to a composition 100% cashmere (or other animal fibre), without damaging the latter. To such end, according to a preferred aspect of the invention, a carbonisation treatment with hydrochloric acid vapours has been identified as particularly suitable. Indeed, rather than an actual combustion of the cellulose material, this treatment causes its disintegration via hydrolysis, following which it can be easily eliminated by subsequent beating and washing.

[0016] Treatments of this type are known and applied for freeing the wool material, in tufts or fabric piece state, from the impurities of cellulose nature (vegetable detritus). In the scope of the method according to the invention, and in the new and advantageous productive combination now proposed, the treatment can be made both continuously and discontinuously, subjecting the garments for example to HCL vapours at the concentration of 17° Bé [Baumé degrees] at the temperature of 80° C (110%, max 112°C) in the proportion of 8-10% of the weight of the material to be treated. The operation has a cycle of about two-hour duration, in rotating drum equipment in which the acid, vaporised by a boiler, is fed through suitably formed axial channels.

[0017] The garments leaving from the carbonisation step, once they have undergone a washing to eliminate all the residues, acquire a 100% cashmere composition, like those obtained with the traditional processes; the yarn composes them returns to a finer count than that of the intermediate mixed yarn. The aspect of the garment therefore has all the quality features conferred by the use of the high quality fibre, with actually an increased softness and voluminosity that derives from the empty spaces left by the cellulose fibres.

[0018] Therefore, thanks to the invention, it becomes possible to attain a final result of maximum quality, outstandingly with the use of the short fibres, up to now unused, which are available in greater quantity and at lower costs than the long fibres of current, exclusive use. The limitation of the costs, quantifiable in a reduction of up to 50% on the yarn and 30% on the final product, is also assisted by the possibility of working a less fine yarn in the knitting or weaving step, the fineness of the yarn count in the finished product remaining the same. Since the

cellulose component is destroyed, it is possible to use viscose, cotton or any other natural or artificial fibre type, even of low quality (and thus low price), as long as it is capable of ensuring, due to its length and strength, the required mechanical binding action.

[0019] Beyond cashmere, the process according to the invention can be used for other animal textile fibres. Generically speaking, in fact, the process that provides for the support of cellulose fibres in the yarn, and the subsequent carbonisation of the garment for the elimination of the same, can be extended to the use in spinning of any animal fibre and for any yarn count, when one wishes to attain the objective of increasing the otherwise insufficient strength of the yarn, given the same quality of the employed animal fibre, or employing animal fibres of lower length, given the same strength of the yarn, or a combination of both.

[0020] Variants and/or modification can be brought to the method for producing knitwear garments with high percentage of cashmere or other animal fibres according to the invention, without departing from the protective scope of the invention itself, as defined by the attached claims.

Claims

1. A method for producing a textile product starting from fibres of cashmere or other animal fibres, **characterised in that:** said animal fibres, in a spinning step, are mixed with an amount of cellulose fibres, said cellulose fibres being at least 8% by weight with respect to the amount of animal fibres; with the mixed yarn thus obtained, the knitting or weaving step, and possibly the assembly of the textile product, are carried out; and the textile product is subjected to a carbonisation treatment in order to eliminate the cellulose component.
2. The method according to claim 1, wherein said carbonisation treatment is a dry treatment with hydrochloric acid vapours.
3. The method according to claim 2, wherein in said carbonisation treatment, said textile garment is subjected to hydrochloric vapours at the concentration of 17° Bé at the temperature of 80°C in the proportion of 8 to 10% of the weight of the material to be treated.
4. The method according to any of the previous claims, wherein said cellulose fibres are mixed in an amount in the range of 8% to 40% by weight with respect to the amount of animal fibres.
5. The method according to claim 4, wherein said cellulose fibres are mixed in an amount equal to about 15% by weight with respect to the amount of animal fibres.

6. The method according to any of the previous claims,
wherein said animal fibres comprise fibres of length
less than about 32 mm.
7. The method according to claim 6, wherein said ani- 5
mal fibres have a maximum length of less than about
32 mm.
8. The method according to any of the previous claims,
wherein said carbonisation treatment is followed by 10
a washing in order to eliminate the cellulose material
residues.
9. The method according to any of the previous claims,
wherein said cellulose fibres are viscose fibres. 15
10. The method according to any of the claims from 1 to
8, wherein said cellulose fibres are cotton fibres.
11. The method according to any of the claims 1 to 8, 20
wherein said cellulose fibres are of any natural or
artificial type.
12. Textile yarn **characterised in that** it comprises an- 25
imal fibres, for example cashmere fibres, of less than
about 32 mm length, mixed with cellulose fibres of
greater length.
13. The yarn according to claim 12, wherein said animal 30
fibres have a maximum length less than about 32
mm.
14. The yarn according to claim 12 or 13, wherein said 35
cellulose fibres are in an amount in the range of 8%
- 40% by weight with respect to the amount of animal
fibres.
15. The yarn according to claim 14, wherein said cellu- 40
lose fibres are in an amount equal to about 15% by
weight with respect to the amount of animal fibres.
16. The yarn according to any of the claims 11 to 15,
where said cellulose fibres are viscose fibres.
17. The yarn according to any of the claims 11 to 15, 45
wherein said cellulose fibres are cotton fibres.
18. The yarn according to any of the claims 11 to 15,
wherein said cellulose fibres are of any natural or 50
artificial type.
19. The yarn according to any of the claims 12 to 17,
having a metric count equal to or greater than 22 Nm.
20. A textile garment, in particular knitwear, obtained 55
with a method according to any of the claims 1 to



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5138

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			TECHNICAL FIELDS SEARCHED (IPC)
			D02G D04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 August 2008	Examiner Pollet, Didier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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